

Strut Attachment System for In-Space Robotic Assembly, Phase II

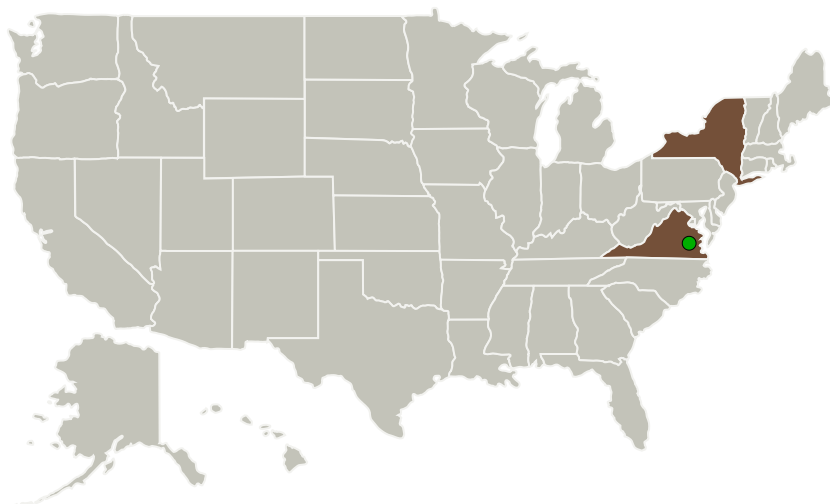
Completed Technology Project (2017 - 2019)



Project Introduction

The size of space systems is currently limited to payload envelopes of existing launch vehicles. Due to this and the customized nature of satellites, existing space systems are very costly to stand up. Nor are they designed for repair, upgrade, or reuse to amortize the cost over multiple missions. As missions get further from low-earth orbit (LEO), the dangers of human extra-vehicular activity (EVA) for manual on-orbit assembly or repair increases, making robotic assembly of large structures very desirable. Honeybee Robotics (Honeybee) proposes to continue development of the Strut Attachment System (SAS) that provides a common electromechanical connection architecture for robotic on-orbit structures assembly. The SAS enables the creation of networked space frame structures with a strut/node architecture; enable payload docking to those structures for power and data transfer; and enable the creation of reusable, serviceable, and upgradable vehicle systems in support of lower cost space exploration. The proposed Phase 2 work plan is to develop the Strut Attachment System to TRL 4 with a robotic assembly demonstration of a networked structure showing power and data network connectivity. The SAS will consist of the Strut Attachment Mechanism, Strut Receptacle, Strut, and Node. Phase 2 will include furthering the development of the Strut Attachment Mechanism and Strut Receptacle, as well as beginning development of the Strut and embedded systems that enable a self-healing power and communications network across an assembled structure. The Phase 1 project resulted in a Strut Attachment Mechanism and Strut Receptacle at TRL 3 at the end of Phase 1 and Phase 2 plans will bring the SAS (Strut Attachment Mechanism, Strut Receptacle, Strut, and embedded systems) to TRL 4 at the end of Phase 2.

Primary U.S. Work Locations and Key Partners



Strut Attachment System for In-Space Robotic Assembly, Phase II Briefing Chart Image

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

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Organizations Performing Work	Role	Type	Location
Honeybee Robotics, Ltd.	Lead Organization	Industry	Pasadena, California
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
New York	Virginia

Project Transitions

▶ **April 2017:** Project Start

✓ **July 2019:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138696>)

Images



Briefing Chart Image

Strut Attachment System for In-Space Robotic Assembly, Phase II
Briefing Chart Image
(<https://techport.nasa.gov/image/136142>)



Final Summary Chart Image

Strut Attachment System for In-Space Robotic Assembly, Phase II
(<https://techport.nasa.gov/image/128854>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Honeybee Robotics, Ltd.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

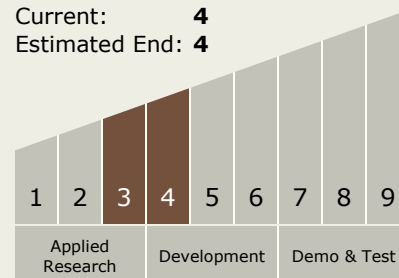
Carlos Torrez

Principal Investigator:

Jason Herman

Technology Maturity (TRL)

Start: 3
Current: 4
Estimated End: 4



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Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.2 Mission Infrastructure, Sustainability, and Supportability
 - └ TX07.2.4 Micro-Gravity Construction and Assembly

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System